Rats, mice and rabbits are the most suitable animals on which to use the luteinising hormone, but they possess the ability to synthesise vitamin C to varying degrees. The guinea pig, while being an admirable subject for tests in connexion with scurvy, does not readily respond to the luteinising hormone. It was found, however, that in guinea pigs, injections of fifty rat units of antuitrin S for three days, while it did not produce a definite corpus luteum, caused considerable luteinisation of groups of cells. These cells also possessed the power of reducing silver nitrate.

Three groups of animals were then placed on a scorbutic diet: (*a*) pregnant females; (*b*) young virgin females, untreated; (*c*) young virgin females receiving fifty rat units of antuitrin S a day subcutaneously (50 rat units = 0·5 c.c. antuitrin S). The diet consisted of bran and pollen, olive oil, wheat germ, Radiostoleum, common salts. All the animals lost weight on this diet. At the end of a fortnight, all the untreated animals had died of typical scurvy—their adrenals giving no reaction with vitamin C.

The treated animals, although having lost considerable weight, were active and showed no signs of scurvy, although two had died of an acute infection. The pregnant animals appeared much the same as when the experiment started and had lost very little weight.

The results of this experiment suggest that the luteal tissue is capable of synthesising vitamin C; it does not disprove the synthesis of vitamin C by the fœtus. It is probable that the synthesis takes place first in the corpus luteum and, once the fœtus is developed, it either takes over, or supplements, the vitaminogenic function of the luteal tissue.

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## Activation of Cambial Growth

EVIDENCE was recently obtained by one of us[1] indicating that the influence coming down from the leaves, which activates cambial growth, is a hormone. Also Laibach[2] has caused decapitated epicotyls of *Vicia Faba* and various leaf-stalks to grow in thickness by placing on them the pollinia of orchids, which he has shown to exude large quantities of auxin, the hormone which promotes the elongation of stems; but he has not stated what anatomical changes were involved. We have now been able to activate cambial growth in decapitated strips of young sunflower hypocotyls, by inserting the upper ends of the strips into a 0·02 per cent solution, in 25 per cent gelatine, of the ether-soluble component of urine, which is known to contain abundant auxin[3]. The gelatine containing the extract was applied in short pieces of glass tube while warm and liquid, and quickly set to a gel. It contained a little thymol (1 in 100,000), and was renewed every three days.

After 19 days, the parts covered by the gelatine had all formed cambia, which were in the normal positions and had grown very strongly, one of them having formed more than twelve layers of secondary xylem. These parts had also, quite unexpectedly, formed numerous roots. A few millimetres below the gelatine, also, there had been distinct cambial growth, though at this level it was very much less. In controls, gelatine and thymol without the extract did not cause any cambium or roots to be formed. The results raise the question whether, in spite of some indications to the contrary[1,4], the hormone activating cambial growth is the same as auxin. The experiments will be continued.

We are much indebted to Dr. Weisberger, of the organic chemistry laboratory, Oxford, for kindly showing us how to extract the ether-soluble component by the method of Kögl and collaborators[3].

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## Recession of the Spiral Nebulæ

THE very recent and inspiring work of Prof. E. A. Milne on world structure has led us to investigate whether there exists a law connecting the velocity and distance of a particle from an observer which is invariant for the generalised Lorentz transformation. In the usual notation, the only law of the form $f(x_1, x_2, x_3, x_4) = 0$ which is invariant for the infinitesimal Lorentz transformation is known to be $x_1^2 + x^2 + x_3^2 + x_4^2 = 0$, which gives the propagation of light. Following this, we have investigated whether there exists a law of the form $\varphi(x_1, x_2, x_3, x_4, u, v, w) = 0$ which is invariant for the generalised Lorentz transformation; here $u = dx_1/dx_4$, $v = dx_2/dx_4$, etc. In its generalised form the transformation is

$$x_1' = x_1 + (hx_1 + ax_2 + bx_3 + cx_4)$$
$$x_2' = x_2 + (-ax_1 + hx_2 + dx_3 + ex_4)$$
$$x_3' = x_3 + (-bx_1 - dx_2 + hx_3 + fx_4)$$
$$x_4' = x_4 + (-cx_1 - ex_2 - fx_3 + hx_4),$$

$$\text{and} \quad u' = \frac{u + (hu + av + bw + c)}{1 + (h - cu - ev - fw)};$$

similarly, $v', w'$ may be obtained. $h, a, b \ldots$ are the constants of the transformation. We have found that the following set of equations is the only invariant set of this type, that is, involving both velocities and co-ordinates:

$$\frac{u}{x_1} = \frac{v}{x_2} = \frac{w}{x_3} = \frac{1}{x_4} \quad \ldots \quad (1)$$

The corresponding equations for $u', v', x_1', \ldots$ follow immediately from (1).

The importance of (1) may be judged from the fact that, next to the equation of light, the most fundamental relation hinged upon the Lorentz transformation is the distance-velocity relation (1), which has been expressed by Milne in the form $v = r/t$.

It is natural to expect that a relation of this nature should hold good only in the outer regions of space where the island universes are too far